NOTICE OF INTENT TO APPEAR

CITY OF LOMPOC plans to participate in the water right hearing regarding:

CACHUMA PROJECT HEARING
Applications 11331 and 11332

Phase I – November 6, 7, 13 and 14, 2000

I/we plan to participate in Phase I: Yes X No ____

I/we plan to participate in Phase II of the hearing: Yes X No ____

I/we plan to call the following witnesses to testify at the hearing:

NAME	SUBJECT OF PROPOSED TESTIMONY	ESTIMATED LENGTH OF DIRECT TESTIMONY	EXPERT WITNESS (Yes/No)
Gary Keefe	Water Use within City of Lompoc	20 mins.	Yes
Timothy J. Durbin	Water Quality Impacts Resulting from Operation of Cachuma Project	20 mins.	Yes
Jeffrey Lefkoff	Water Quality Impacts Resulting from Cachuma Project	20 mins.	Yes
David Schuster	Surface Water Operations on the Santa Ynez River and Supply; Reliability of SWP Water	20 mins	Yes
Paul Bratovich	Fishery Issues	20 mins.	Yes

Name, Address, Phone Number and Fax Number of Attorney or Other Representative

Signature: _____ Dated: October 11, 2000

Name: Sandra K. Dunn of Somach, Simmons & Dunn

Mailing Address: 400 Capitol Mall, Suite 1900, Sacramento, CA 95814

Phone Number: (916) 446-7979 Fax Number: (916) 446-8199

E-mail Address: sdunn@lawssd.com

*For each person testifying as an expert witness, please attach a statement of qualifications.

RESUME

GARY P. KEEFE
UTILITIES DIRECTOR

CITY OF LOMPOC
POST OFFICE BOX 8001
LOMPOC, CALIFORNIA 93438
(805) 875-8299

EDUCATION:

Bachelor of Science, Microbiology. 1976
California Polytechnic State University
San Luis Obispo, California

PROFESSIONAL HISTORY:

1994 to Present: Utilities Director, City of Lompoc. Mr. Keefe directs the overall operation of the Utilities Department, which includes the wastewater, water and electric divisions. He serves as staff representative to outside agencies on matters pertaining to utility functions, prepares and controls departmental budgets, answers regulatory compliance, and assures safe, reliable and economic operations.

October 1976 to 1994: 1983 to 1994. Water Resources Manager. City of Lompoc. Mr. Keefe was responsible for the activities of the City's Water Division and Regional Wastewater Management System, and served as Secretary to the Lompoc Water Commission. He developed and recommended long range plans, capital improvement programs, utility service rates, prepared and controlled the Water and Wastewater budget. He was the City's representative on the Coastal Branch Aqueduct Technical Committee and the Cachuma Enlargement Technical Committee, and served as the City's principle liaison with outside agencies on water related issues.

1980 to 1983 - Wasterwater Superintendent. City of Lompoc. Mr. Keefe served as Division Head in charge of the City of Lompoc's Regional Wastewater Management System, which provides wastewater treatment and conveyance for the City of Lompoc, Vandenberg Village and Vandenberg Air Force Base.

October 1976 to 1994 (Continued): 1979 to 1980 - Wastewater Plant Operations Supervisor. City of Lompoc. Mr. Keefe was responsible for the operation and maintenance of Lompoc Regional Wastewater Treatment Plant, an advanced secondary treatment plan utilizing activated sludge, coupled biological oxidation and anaerobic digestion with methane recovery (modified co-generation), and was responsible for source control.

1977 to 1979 - Laboratory Technician. City of Lompoc.

1976 to 1977 - Wastewater Plant Operator. City of Lompoc.

1972 to 1976: Water and Wastewater System Operator, Avila Beach County Sanitation District. Part-time work while attending college. Avila Beach, CA.

1967 to 1971: Accounting Specialist, E-5, United States Air Force, Keesler Air Force Base, Mississippi.

1965 to 1967: Pipeline Construction Worker, Southern California Gas Company, San Luis Obispo, California

PROFESSIONAL AFFILIATIONS:

Past-Member, Water Resources Management Committee, California/Nevada Section, American Water Works Association

Past-Chair, Tri-Counties Section, California Water Pollution Control Association

Past-Chair, Lompoc Valley Chapter, National Management Association

Member, American Water Works Association

Member, Water Pollution Control Federation

Member, California Water Environment Association

PROFESSIONAL AFFILIATIONS (CONTINUED):

Member, American Public Works Association

Member, City of Lompoc Employee Development Association

Member, American Public Power Association

Alternate Commissioner, Northern California Power Agency

Alternate Commissioner, Transmission Agency of Northern California

Timothy J. Durbin, Inc.
4509 Woodfair Way
Carmichael, CA 95608
(916) 966-8637

Timothy J. Durbin

Ground-Water and Surface-Water Hydrologist

Education

Master of Science in Civil Engineering, 1971
Stanford University, Stanford, California

Bachelor of Science in Civil Engineering, 1967
Stanford University, Stanford, California

Registration

Registered Civil Engineer, California
Professional Engineer (Civil), Nevada
Professional Engineer (Civil), Oregon
Professional Engineer (Civil), Texas

Professional Societies

American Society of Civil Engineers
American Geophysical Union
National Association of Groundwater Scientists and Engineers
International Association of Hydrologists

Awards & Honors

U.S. Department of the Interior Honor Award
U.S. Coast Guard Achievement Award

Professional Experience

February 1999 to Present

Timothy J. Durbin, Inc., Carmichael, California, President. Directs projects relating to ground-water and surface-water hydrology. Areas of expertise include design of multidisciplinary investigations, design of large-scale programs for the collection and interpretation of hydrologic data, and application of mathematical modeling to the analysis of problems in ground-water and surface-water hydrology. Examples of such projects include:

- Analyzed the impacts of water-resource development and reservoir operations on water supply, streamflows, regional economics, and wildlife resources within the North Platte River Basin, Nebraska and

involving agricultural engineers, ground-water hydrologists, surface-water hydrologists, agricultural economists, and environmental scientists in six different consulting firms. Work is being done in support of litigation before the U.S. Supreme Court between the states of Nebraska and Wyoming.

- Analyzed the occurrence of MTBE in the Santa Monica ground-water basin, California. MTBE contamination from multiple sites has resulted in abandonment of public-supply wells. An analysis of the sources and fate of MTBE within the Santa Monica ground-water basin is being conducted. Work is being done within the context of State and Federal regulatory proceedings.

- Analyzed the relationship of landscape irrigation to the occurrence of a large-scale landslide in a residential area of Anaheim, California. The work involved developing a hydrologic description of the landslide area and then developing a ground-water model. The work was done in support of litigation.

- Assigned as Special Master in a technical dispute between City of San Bernardino, California and the Regional Water Quality Control Board. The issue is the cause of a wastewater discharge to the Santa Ana River. The work is being done within the context of a State regulatory proceeding.

May 1998 to January 1999

Bookman-Edmonston Engineering, Inc., Sacramento, California, Vice President. Directed projects related to ground-water and surface-water hydrology. Directed a staff of about 30 engineers, hydrologists, biologists, and geologists. Examples of such projects include:

- Analyzed the causes of flooding near Phoenix, Arizona. Residential and commercial areas were flooded during a summer storm. The analysis involved assessing the effect of irrigation ditches and other facilities on the depth of flooding. The work was done in support of litigation.

- Analyzed the impact of floodflows on the failure of a stream pipeline crossing within Thousand Oaks, California. A large sewer line failed owing to channel erosion during an extreme flood event. The recurrence interval of the erosion event was analyzed. The work was done within the context of a State regulatory proceeding.

- Analyzed the causes of soil saturation within an almond orchard near Turlock, California. The work involved evaluating the effects of

drainage pumping, precipitation, and irrigation on the depth below the land surface to the groundwater table. The work was done in support of litigation.

- Analyzed the effects of a large parking lot on downstream flooding and channel erosion. The work was done in support of litigation.

March 1989 to May 1998

Hydrologic Consultants, Inc., Sacramento, California. President. Directed projects related to ground-water and surface-water hydrology. Directed a staff of about 10 hydrologists, geologists, and engineers. Examples of such projects include:

- Analyzed the impacts of urban development on the water quality of Lake Tahoe, California. Work involved the analysis of sediment and nutrient transport in streams tributary to the lake and nutrient cycling within the lake. Work was done for litigation.

- Analyzed streamflow temperature within the Owens River, Owens Valley, California. Work was done to evaluate the hydrologic feasibility of reestablishing a fishery within the Owens River.

- Analyzed the source and management of surface-water and ground-water salinity within the Lompoc ground-water basin. Work involved developing groundwater and surface-water models of the Santa Ynez River basin, including salinity models. Work was done in support of litigation.

- Analyzed the causes and management of drainage water discharges from the Firebaugh and Central California Water District to natural watercourses and the San Joaquin River. Work was done in support of litigation.

- Developed a model for the optimal use of ground water and surface water within the Turlock and Modesto Irrigation Districts for the benefit of water supply and environmental resources. Work was done in support of the FERC re-licensing of New Don Pedro Reservoir.

- Analyzed the optimal facilities and facility operation for ground water and surface water within the Salinas Valley, California. Work involved development of ground-water, reservoir-operations, and optimization models. Work was done in support of litigation.

- Analyzed the source of soil and ground-water contamination by petroleum hydrocarbons at Santa Barbara, California. Work was done in support of litigation.

- Analyzed the source of soil and ground-water contamination by petroleum hydrocarbons at Oxnard, California. Work was done in support of litigation.

- Analyzed the occurrence of high ground-water levels in the San Bernardino Valley, California using surface-water and ground-water models. High ground-water levels resulted from excess artificial recharge and other factors. Work was done in support of litigation.

- Analyzed the effects of ground-water pumping and other factors in the depletion of streamflow in the Arkansas River at the Colorado-Kansas state line using surface-water, ground-water, and institutional models. Work was done in support of litigation in the U.S. Supreme Court between the states of Kansas and Colorado.

- Analyzed the effects of geothermal development on thermal-spring discharges in the Mammoth Lakes area, California using ground-water and heat-transport models. Work was done in support of litigation.

October 1985 to March 1989

S.S. Papadopulos & Associates, Inc., Davis, California, Vice President, and Manager of Davis office. Directed and conducted investigations of numerous aspects of ground-water hydrology. Examples of such projects include:

- Analyzed the migration of ground-water contaminants at the Love Canal hazardous waste site in Niagara Falls, New York using a ground-water model. The Love Canal site is a Superfund Site. Work was done in support of litigation.

- Analyzed the migration of ground-water contaminants at the Lone Pine landfill near Freehold, New Jersey. The Lone Pine landfill is a Superfund site. Work was done as part of a remedial investigation.

- Developed a computer program for the simulation of soil-water movement within and near a land-disposal facility. Work was done for the U.S. Environmental Protection Agency in support of the preparation regulations relating to the design of cover, liner, and leak-detection systems for land-disposal facilities.

- Developed a ground-water management plan for the San Bernardino Valley ground-water basin, California using a ground-water model and the techniques of operations research.

- Analyzed the impacts of urban development on flooding and sediment transport for streams in Orange County, California. Work was done to support the permitting of a large residential and commercial development project.

July 1984 to October 1985

Williamson and Schmid, Hydrotec Division, Davis, California. Manager of Davis office. Directed and conducted investigations for evaluation of ground-water resources, management of regional ground-water systems, and evaluation of hazardous waste sites. Studies involved identification of essential hydrologic issues, collection of hydrologic data, and application of quantitative methods to evaluate alternatives and to select an optimal solution. Examples of such projects include:

- Developed a three-dimensional ground-water model of a physical barrier at a hazardous waste landfill in order to evaluate performance of the existing barrier and proposed modifications. Work was done for regulatory compliance.

- Analyzed a hazardous waste site using isotope geochemistry and ground-water models as investigative tools. Work was done for regulatory compliance.

- Analyzed the utilization of fresh water body overlying saline water using surface geophysical techniques and a density-dependent ground-water flow model.

August 1982 to July 1984

U.S. Geological Survey, Water Resources Division, California District. District Chief (GS-15). Managed California District (350 persons in 14 offices) with annual budget of $25 million (in 1995 dollars) for hydrologic investigations. Responsible for developing plans for hydrologic investigations and ensuring plans were implemented. Provided organizational and technical input to development of large scale, multi-agency investigations. Examples of such projects include:

- Investigation of water quality related to agricultural drainage from the west side of San Joaquin Valley, California.

- Investigation of hydrodynamics of San Francisco Bay and Sacramento-San Joaquin, California Delta hydrologic systems.

- Investigation of the effects of exporting water from Owens Valley ground-water basin, California, including both hydrologic and biological impacts.

- Assessment of the ground-water resources of the Central Valley, California. Work was part of the Central Valley Regional Aquifer System Analysis (RASA).

- Development of numerical finite element codes (now used within the U.S. Geological Survey) for simulation of two- and three-dimensional ground-water flow and solute transport.

July 1977 to August 1982

U.S. Geological Survey, Water Resources Division, Nevada District. District Chief (GS-14) from 1/80 to 8/82 and Assistant District Chief (GS-13) from 7/77 to 1/80. Managed Nevada District (80 persons in three offices) with annual budget of $10 million (in 1995 dollars) for hydrologic investigations. Projects included:

- Design and organization of Truckee-Carson River Quality Assessment and Great Basin Regional Aquifer System Analysis (RASA).

- Development of ground-water and solute transport models for Washoe Valley, Galena Creek, Eagle Valley, and Carson Valley ground-water basins in Nevada.

- Design and organization of regional geothermal investigations of areas throughout Nevada including Dixie Valley, Ruby Valley, Black Rock Desert, and Carson Desert.

July 1972 to July 1977

U.S. Geological Survey, Water Resources Division, California District. Hydrologist (GS-13; 12/75 to 7/77), Hydrologist (GS-12; 10/74 to 12/74), Hydrologist (GS-11; 9/73 to 10/74), and Hydrologist (GS-9; 7/72 to 9/73). Served as Project Chief for numerous ground-water projects involving hydrogeologic and geophysical investigations and ground-water modeling. Conducted research in development of finite-element models for simulation of ground-water flow and mass transport. Applied results of research to solution of management problems and provided assistance to hydrologists within USGS and other public agencies in use of these models.

Timothy J. Durbin, Inc.
4509 Woodfair Way
Carmichael, CA 95608
(916) 966-8637

Timothy J. Durbin

Publications

1. *Durbin, T.J.*, 1974, Digital simulation of the effects of urbanization on runoff in the upper Santa Ana Valley, California: U.S. Geological Survey Water-Resources Investigations 41-73, 44 p.

2. *Durbin, T.J.*, and Hardt, W.F., 1974, Hydrologic analysis of the Mojave River, California, using a mathematical model: U.S. Geological Survey Water-Resources Investigation 17-74, 50 p.

3. *Durbin, T.J.*, 1975, Selected effects of suburban development on runoff in south-coastal California: in Proceedings of Second National Symposium on Urban Hydrology and Sediment Control, Lexington, Kentucky, p. 209-217.

4. *Durbin, T.J.*, 1975, Ground-water hydrology of Garner Valley, San Jacinto Mountains, California - a mathematical analysis of recharge and discharge: U.S. Geological Survey Open-File Report 75-305, 40 p.

5. *Durbin, T.J.*, 1978a, Application of Gauss algorithm and Monte Carlo simulation to the identification of aquifer parameters: in Proceedings of 26th Annual American Society of Civil Engineers Hydraulic Division Specialty Conference, College Park, Maryland, p. 101-111.

6. *Durbin, T.J.*, 1978b, Calibration of a mathematical model of the Antelope Valley ground-water basin, California: U.S. Geological Survey Water-Supply Paper 2046, 51 p.

7. *Durbin, T.J.*, and Morgan, C.O., 1978, Well-response model of the confined area, Bunker Hill ground-water basin, San Bernardino County, California: U.S. Geological Survey Water-Resources Investigation 77-129, 39 p.

8. Arteaga, F.E., and *Durbin, T.J.*, 1978, Development of a relation for steady-state pumping rate from Eagle Valley ground-water basin, Nevada: U.S. Geological Survey Open-File Report 79-261, 44 p.

9. *Durbin, T.J.*, Kapple, G.W., and Freckleton, J.R., 1978, Two-dimensional and three-dimensional digital flow models of the Salinas Valley ground-water basin, California: U.S. Geological Survey Water-Resources Investigation 78-113, 134 p.

10. Van Denburgh, A.S., Seitz, H.R., *Durbin, T.J.*, and Harrell, J.R., 1982, Proposed monitoring network for ground-water quality, Las Vegas Valley, Nevada: U.S. Geological Survey Open-File Report 80-1286, 25 p.

11. *Durbin, T.J.*, 1983, Application of Gauss algorithm and Monte Carlo simulation to the identification of aquifer parameters: U.S. Geological Survey Open-File Report 81-688, 26 p.

12. Katzer, T., *Durbin, T.J.*, and Maurer, D.K., 1984, Water-resources appraisal of the Galena Creek basin, Washoe County, Nevada: U.S. Geological Survey Open-File Report 84-433, 59 p.

13. Kapple, G.W., Mitten, H.T., *Durbin, T.J.*, and Johnson, M.J., 1984, Analysis of Carmel Valley alluvial ground-water basin, California, using digital flow model techniques: U.S. Geological Survey Water-Resources Investigation 83-4280, 45 p.

14. Hromadka, T.V., and *Durbin, T.J.*, 1984, Adjusting the nodal point distribution in domain ground-water flow numerical models: in Proceedings of Fifth International Conference on Finite Elements in Water Resources, p. 265-284.

15. *Durbin, T.J.*, and Berenbrock, C., 1985, Three-dimensional simulation of free-surface aquifers by the finite-element method: U.S. Geological Survey Water-Supply Paper 2270, p. 51-67.

16. Martin, P., and *Durbin, T.J.*, 1990, Identification of net-flux rates for ground-water models: U.S. Geological Survey Water-Supply Paper, 2340, pp. 119-130.

17. Hromadka, T.V., and *Durbin, T.J.*, 1986, Two-dimensional dam-break analysis for Orange County Reservoir: Water Resources Bulletin, v. 22, n. 2, p. 249-256.

18. Hromadka, T.V., and *Durbin, T.J.*, 1986, Modeling steady-state advective transport by the CVBEM: Engineering Analysis, v. 3, n. 1, p. 9-15.

19. *Durbin, T.J.*, 1988, Two-dimensional simulation of ground-water flow by finite-element method: Microsoftware for Engineers, v. 2, n. 1, p. 40-48.

20. Azrag, E.A., *Durbin, T.J.*, and Nour El-Din, N.N., 1986, Two-dimensional simulation of solute transport by finite-element method: Microsoftware for Engineers, v. 2, n. 3, p. 171-180.

21. Atkinson, L.C., *Durbin, T.J.*, and Azrag, E.A., 1992, Estimating the effects of non-Darcian flow on inflow to a pit and slope stability: Society for Mining, Metallurgy, and Exploration 1992 Annual Meeting, Paper 92-156, 4 p.

22. *Durbin, T.J.*, and Atkinson, L.C., 1993, Optimizing the design of mine dewatering systems: Society for Mining, Metallurgy, and Exploration 1993 Annual Meeting, Paper 93-103, 5 p.

23. Avon, L., and *Durbin, T.J.*, 1994, Evaluation of the Maxey-Eakin method for estimating recharge to ground-water basins in Nevada: Water Resources Bulletin, v. 30, n. 1, pp. 99-112.

24. *Durbin, T.J.*, Bond, L.D., 1997, *FEMFLOW3D*: A finite-element program for the simulation of three-dimensional aquifers, Version 1.0: U.S. Geological Survey Open-File Report 97-810, 338 p.

25. Hromadka, T. V., *Durbin, T.J.*, 2000, Estimating changes in sediment transport trends due to catchment changes: in Proceedings of Floodplain Management Association Conference on Non-Structural Solutions to Floodplain Management, San Diego, Calif.

BOOKS

1. Hromadka, T.V., *Durbin, T.J.*, and DeVries, J.J., 1984, Computer methods in water resources: Lighthouse Publications, Mission Viejo (California), 344 p.

2. Hromadka, T.V., McCuen, R.H., Devries, J.J., and *Durbin, T.J.*, 1993, Computer methods in environmental and water resources engineering: Lighthouse Publications, Mission Viejo (California), 590 p.

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Timothy J. Durbin

Selected Clients

Industrial Companies

Advanced Micro Devices
AMPAC
BKK Landfill
Chevron
Conoco
Fairchild
Firemans Fund Insurance Company
Lockheed Martin Corporation
Montgomery Ward
Pacific Gas & Electric Company
Pacific Gas & Electric Land Company
Raychem
Seven W Corporation
Sola Optical
Southern California Edison
Southern Pacific Transportation Company
Teledyne
Teledyne McCormick Selph
Tosco Refineries
Unocal
U. S. Tungsten Corporation
Union Pacific Rail Road Company
Waste Management of North America
Pacific Gas & Electric Land Company

Law Practices

Bartkiewicz, Kronic & Shanahan, Sacramento
Carroll, Burdick & McDonough, San Francisco
Comeau & Maidegen, Santa Fe
DeCuir & Somach, Sacramento
Derby, Cook, Quinby & Tweedt, San Francisco
Downey, Brand, Seymour & Rohwer, Sacramento

Ellison & Schneider, Sacramento
Gibson, Dunn & Crutcher, Los Angeles
Holme, Roberts & Owen, Denver
Normoyle & Newman, Modesto
Steinheimer, Riggio & Haydel, Stockton
Straw & Gilmartin, Santa Monica
Straw & Gough, Santa Monica
Jackson, Tufts, Cole & Black, San Francisco
Kronic, Moskovitz, Tiedemann & Girard, Sacramento
Landels, Ripley & Diamond, San Francisco
Latham & Watkins, Los Angeles
Loeb & Loeb, Los Angeles
McClintock & Weston, Los Angeles
McCutcher, Doyle, Brown & Enersen, San Francisco
McDonough, Holland & Allen, Sacramento
Morgan, Lewis & Bockius, Washington, D. C.
Morgan, Lewis & Bockius, Philadelphia
Morgan, Lewis & Bockius, Los Angeles
Munger, Tolles & Olson, San Francisco
O'Melveney & Meyers, San Francisco
Rutan & Tucker, Costa Mesa
Salmon, Lewis & Weldon, Phoenix
Simms & Stein, Santa Fe
Sonnenschein, Nath & Rosenrhal, San Francisco
Twitchell & Rice, Santa Maria

Government Agencies

Arriyadh Development Authority, Saudi Arabia
California Attorney General
California Department of Fish and Game
California Department of Water Resources
City of Anaheim, California
City of Atascadaro, California
City of Banning, California
City of Davis, California
City of Lompoc, California
City of Thousand Oaks, California
City of Wendover, Nevada
Elko County Public Works, Nevada
Imperial Irrigation District, California
Kansas Attorney General
Kansas Department of Water Resources
Las Vegas Valley Water District, Nevada
Modesto Irrigation District, California
Monterey County Water Resources Agency, California

Nebraska Attorney General
Nebraska Department of Water Resources
Southern Nevada Water Authority
Truckee Carson Irrigation District, Nevada
Turlock Irrigation District, California
U. S. Bureau of Reclamation
U. S. Environmental Protection Agency
U. S. Geological Survey
Washoe County District Attorney, Nevada
Washoe County Water Agency, Nevada
Yolo County Flood Control and Water Conservation District, California

L. JEFFREY LEFKOFF
Principal Hydrologist

Dr. Lefkoff has provided water-resource consulting services in California for 12 years. His consulting clients have included water districts and municipalities throughout the state. He has conducted hydrological analysis of several large-scale ground-water and surface water systems, and evaluated water management practices on regional water resources. Recent projects include: the Semitropic groundwater region in the Tulare basin, the Mojave groundwater basin, the Santa Ynez River basin in central California, the Stanislaus-Merced basin, and the Salinas Valley. Dr. Lefkoff has also worked as a research hydrologist with the U.S. Geological Survey in Menlo Park for five years, where he developed computer models to design optimal groundwater supply and conjunctive use systems. In 1995, he was elected Convenor of the Bay-Delta Modeling Forum, a non-profit organization devoted to improving the use of technical analyses in water management decisions for the Central Valley, the Delta, and San Francisco Bay.

Education

Doctor of Philosophy in Hydrogeology, 1988
Stanford University, Stanford, California

Master of Science in Forest Hydrology, 1980
University of Georgia, Athens, Georgia

Bachelor of Arts in Political Philosophy, 1977
Northwestern University, Evanston, Illinois

Registrations

Registered Geologist, California (5833)

Professional Societies

American Geophysical Union
American Water Resources Association
Association of Ground-Water Scientists & Engineers

Professional Activities

Editorial Board, Journal of Ground Water
Convener, Bay-Delta Modeling Forum

Awards and Honors

American Geophysical Union, Congressional Science Fellowship
U.S. Geological Survey Research Award

Professional Experience

1998 to 2000

Navigant Consulting, Inc., Rancho Cordova, CA – **Principal Hydrologist**. Provide water-resource consulting services, including regional supply planning and basin analysis, to municipal governments, irrigation districts, and investor-owned utilities. Responsible for all aspects of client relationships, including project development, project management, staff assignments, and quality of final work products. Managed projects that included:

- Construction of a groundwater flow model of the Stored Water Recovery Program for the Semitropic Water Storage District. The modeling analysis was used in the project EIR to determine the effects of storage operations on regional groundwater levels, salt transport, and subsidence.
- Development and application of a groundwater model of the Victorville region of the Mojave Groundwater Basin. The model was used in a EIR of a proposed power plant and the plant's use of stored groundwater for cooling. Testimony was provided to the California Energy Commission in administrative hearings.
- Analysis of the potential for large-scale managed recharge to improve groundwater conditions and spring discharge in the Eastern Snake Plane Aquifer, southern Idaho.

1989 to 1998

Hydrologic Consultants, Inc., Sacramento, California – **Principal Hydrologist and Vice President**. Areas of expertise include computer modeling of ground-water systems, mathematical optimization for water-resource management, statistical analysis of hydrologic problems, and regulatory compliance for industrial and agricultural activities that affect ground water. Managed projects that included:

- Development of ground-water management plans for the Turlock and Modesto irrigation districts in the San Joaquin Valley, California. Plans include management of ground-water levels, ground-water pumping, reservoir releases, canal flows, deliveries, and water quality.
- Analysis of impacts of groundwater development on flows in the North Platte River in Wyoming. Developed and applied groundwater models to evaluate streamflow depletion. Deposed as expert witness in interstate lawsuit between the states of Nebraska and Wyoming before U.S. Supreme Court. Litigation is pending.
- Analysis of causes of ground-water salinity for the City of Lompoc in Santa Barbara County, California, which relies on ground water as sole supply. Developed a

series of integrated models that account for salinity-discharge relationships, stream routing, reservoir operations, stream-aquifer interactions, and ground-water flow and salinity. Used modeling analysis in support of client's claims for damages from responsible parties.

- Analysis of long-term hydrologic impacts of ground-water use in Arkansas River Basin in Colorado and Kansas. Developed and applied computer models to simulate rainfall-runoff processes, surface-water irrigation, ground-water pumping, and reservoir operation. Provided expert testimony in interstate lawsuit before U.S. Supreme Court.

- Evaluation of alternative facility projects to control seawater intrusion in the Salinas Valley. Identified causes of intrusion and effectiveness of various remediation measures.

- Evaluation of effects of proposed surface-water reservoirs, conjunctive use programs, and regulatory changes on California State Water Project (SWP) and Central Valley Project (CVP). Developed and implemented modeling techniques to simulate SWP and CVP with and without reservoirs and regulatory standards.

- Evaluation of operational changes and capital improvements for regional municipal water district in Ventura County, California. Developed and applied optimization model of water distribution system to evaluate benefits of capital improvements and proposed ground-water storage program.

- Oversight of demand and supply models useage within Integrated Resources Planning process for the Metropolitan Water District of Southern California. Served on expert panel for internal review.

- Litigation support in defense of the City of Banning, California against claims of damage by a nearby water district regarding municipal ground water pumping. Analyzed effects of pumping on long-term ground-water levels in adjacent areas. Provided expert testimony in San Bernardino Superior Court.

- Litigation support in water-rights dispute between adjacent property owners in Napa County, California. Assessed effects of upland reservoir on downstream flows in a small creek. Provided expert testimony in Napa Superior Court.

- Litigation support in flooding dispute between adjacent property owners in Sacramento County, California. Provided expert testimony in Sacramento Superior Court.

- Oversight of regional ground-water model development for the Boise basin in southwest Idaho. Provided quality control and advice on project management.

1983 to 1988

U.S. Geological Survey, Water Resources Division, Menlo Park, California -- **Research Hydrologist**. Conducted research on management of groundwater resources using numerical modeling. Applied concepts and techniques of systems analysis to evaluate ground water and surface water. Projects included:

- Design and cost analysis of aquifer restoration using computer simulation of ground-water flow and contaminant transport combined with mathematical optimization.

- Development of a general computer model for ground-water management linking flow simulation with linear programming.

January 1981 to June 1982

U.S. Geological Survey, Water Resources Division, Miami, Florida. **Hydrologist**. Investigated the interaction between Biscayne aquifer and system of overlying water management canals.

L. Jeffrey Lefkoff

Publications

1. *Lefkoff, L.J.*, and D.R. Kendall, 1999. Development of a cumulative distribution function for virus transportation in groundwater, (in press).

2. *Lefkoff, L.J.*, and D.R. Kendall, 1997. Decision analysis and optimization modeling for complex water resource systems: Proceedings of the 1997 Georgia Water Resources Conference, University of Georgia, Athens, Georgia.

3. *Lefkoff, L.J.*, and D.R. Kendall, 1996. Yields from ground-water storage for California State Water Project, ASCE Journal of Water Resources Planning and Management, 122:72-74.

4. *Lefkoff, L.J.*, and D.R. Kendall, 1996. Optimization modeling of a new facility for the California State Water Project, Water Resources Bulletin, 32:451-462.

5. *Lefkoff, L.J.*, 1991, The use of hydrogeologic models in governmental decision making: Symposium Chairman at conference of Geological Society of America, San Francisco, California.

6. *Lefkoff, L.J.*, and Gorelick, S.M., 1990, Simulating physical processes and economic behavior in saline, irrigated agriculture - model development: Water Resources Research, v. 16, n. 7, pp. 1359-1369.

7. *Lefkoff, L.J.*, and Gorelick, S.M., 1990, Benefits of water marketing in an irrigated, saline stream-aquifer system: Water Resources Research, v. 16, n. 7, pp. 1371-1381.

8. *Lefkoff, L.J.*, 1990, Nuclear waste, hazardous materials, and major league baseball - case studies in public perception and national politics: Paper presented to Geology Colloquium, University of Texas, El Paso, Texas.

9. *Lefkoff, L.J.*, 1989, Earth science and the legislative process - lessons from within the U.S. Congress: Paper presented to Geoscience Symposium, Princeton University, Princeton, New Jersey.

10. *Lefkoff, L.J.*, and Gorelick, S.M., 1988, Simulation of water marketing in an irrigated, saline stream-aquifer system: Paper presented to American Geophysical Union, San Francisco, California.

11. *Lefkoff, L.J.*, 1988, Local politics, national science: EOS, Transactions of American Geophysical Union, v. 68., no.8, p. 115.

12. *Lefkoff, L.J.*, 1987, Scientists must listen to be heard: EOS, Transactions of American Geophysical Union, v. 68, no. 37, p. 754-755.

13. *Lefkoff, L.J.*, and Gorelick, S.M., 1987, AQMAN - Linear and quadratic programming matrix generator using two-dimensional ground-water simulation for aquifer management modeling: U.S. Geological Survey Water-Resources Investigation 87-4061, 130 p.

14. Reichard, E.G. and *Lefkoff, L.J.*, 1987, Discussion of AThe optimal steady-state in ground-water management: by K.C. Knapp and E. Feinerman, Water Resources Bulletin, v. 23, n. 4, p. 717-721.

15. *Lefkoff, L.J.*, and Gorelick, S.M., 1986, Design and cost analysis of rapid aquifer restoration systems using flow simulation and quadratic programming: Ground Water, v. 24, n. 6, p 777-790.

16. *Lefkoff, L.J.*, and Gorelick, S.M., 1985, Rapid removal of a ground-water contaminant-plume: Paper presented to American Water Resources Association, Symposium on Ground-water Contamination and Reclamation, Tucson, Arizona.

David R. Schuster
Principal Analyst

SWRI SURFACE WATER RESOURCES, INC.

Expertise

Mr. Schuster has been involved in the development of much of the significant water policy in California in recent years, including the historic Bay/Delta Accord that brought federal, state, environmental, agricultural, municipal, and industrial interests to agreement on water quality standards for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. Mr. Schuster was formerly the Assistant Regional Director for the Mid-Pacific Region of the U.S. Bureau of Reclamation, directing all planning, design, construction, and operations activities of the Central Valley Project. Also, as former General Manager of the State Water Contractors, he represented agencies before the California Department of Water Resources, State Water Resources Control Board, the California Legislature, and Congress.

Currently, Mr. Schuster is active in local, regional, and statewide forums addressing water supply, flood protection, Bay/Delta water quality, water transfer, and water policy initiatives on behalf of SWRI clients. As part of these initiatives, Mr. Schuster is working with state and federal water, fisheries, and other resources agencies on resolving issues critical to the reliability and adequacy of California's water supplies.

Education

Bachelor of Science in Civil Engineering, 1965
California Polytechnic State College, Pomona

Professional History

Principal Water Policy Analyst and Partner, Surface Water Resources, Inc.
1996 - Present

Water Management/Policy Consultant
1989 - 1996

General Manager, State Water Contractors
1982 - 1989

Assistant Regional Director, U.S. Bureau of Reclamation, Mid-Pacific Region
1980 - 1982

Assistant Director, Operations and Maintenance Policy Staff, U.S. Bureau of Reclamation, 1979 - 1980

Chief, U.S. Bureau of Reclamation, Mid-Pacific Region, Central Valley Project Water Operations Branch , 1972 - 1979

Project Experience and Responsibilities

Water District Operations and Management Consultation - Mr. Schuster provides management consulting services to local, regional, and wholesale water purveyors throughout California. He advises districts on existing and proposed water policies and facility development programs relative to regional, state, and federal water project operations criteria and plans. He represents clients in negotiations of water transfers, contract renewals, and water/power operations agreements. He also supports technical and economic evaluations of legislative, regulatory, and judicatory proposals concerning water management at the local, state, and federal levels.

Folsom Dam and Reservoir Reoperation Agreement - Sacramento Area Flood Control Agency - Mr. Schuster is Principal-In-Charge representing the Sacramento Area Flood Control Agency in a study to determine the feasibility of indefinitely extending SAFCA's Folsom Dam and Reservoir reoperation agreement with Reclamation. Coordinating modeling studies to determine effects of reoperation given possible changes in: CVP water transfer facilities, demands on the CVP, and instream requirements of the lower American River. Responsible for carrying out meetings with federal and state regulatory agencies to determine the need for consultation under the federal and state endangered species acts. Facilitating discussions with local water interests to determine potential reservoir-related impacts to fishery and wildlife resources, water supply, and recreation resulting from long-term reoperation.

Central Valley Project/State Water Project Operations Alternative - Association of California Water Agencies Ag/Urban Technical Group - Mr. Schuster has been retained by the Ag/Urban Technical Group to assist them in identifying a preferred Central Valley Project/State Water Project operations alternative for presentation to CALFED. Currently, coordinating operational studies on multiple alternatives, including options for: no new facilities, fully isolated canal water transfer facility, dual facility, and through Delta water transfer alternatives. These studies will give consideration to facility availability; the regulatory environment, such as the Delta Accord, water quality standards, export/diversion limitations, and endangered species; export flow relationships; and fish screen efficiency.

U.S. Bureau of Reclamation - Mr. Schuster has held various positions within Reclamation, both at the Regional level and in the Washington D.C. office. He assisted the Commissioner of Reclamation with development of all water, land, power operations, and maintenance policies. He also had responsibility for all of Reclamation's water contract negotiation strategies and water contract approvals. For a significant portion of his tenure with Reclamation, he was directly responsible for all Central Valley Project water operations decisions.

State Water Contractors - Mr. Schuster was the General Manager for the State Water Contractors, an association of California public agencies that have contracts for water service from the State Water Project. Represented these agencies before the Department of Water Resources, State Water Resources Control Board, the State Legislature, and Congress on issues related to the cost and reliability of the contractors' State Water Project water supply.

Water Supply Consultation - As an independent consultant, Mr. Schuster has assisted clients with management of policy and technical efforts to resolve water supply problems. His clients have included Kern County Water Agency, State Water Contractors, the City of Lompoc, and the Sacramento Area Flood Control Agency.

Paul M. Bratovich
Principal Scientist

SWRI SURFACE WATER RESOURCES, INC.

Expertise

Mr. Bratovich has worked as a fisheries consultant in California for the past 17 years. Mr. Bratovich has conducted analyses on numerous listed and proposed-listed aquatic species, with an emphasis on anadromous salmonids. As a recognized fisheries expert, he is actively participating in a broad range of forums in a variety of consultative, advisory, and technical expert capacities. His experience also includes regulatory and technical consultations with the California Department of Fish and Game, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and other agencies concerning flow-habitat relationships, habitat restoration, population dynamics, endangered species, and strategic water planning.

Education

Master of Science in Fishery Resources, 1985
University of Idaho

Bachelor of Science in Fisheries, 1977
University of Washington

Professional History

Principal Scientist and Partner, Surface Water Resources, Inc.
1996 - Present

Senior Scientist and Regional Manager, Beak Consultants, Inc.
1987 - 1996

Aquatic Biologist, D.W. Kelly and Associates
1983 - 1986

Representative Project Experience and Responsibilities

Sacramento Area Water Forum Plan Supplement and EIR - City-County Office of Metropolitan Water Planning - Continues to serve as the fisheries and instream flow expert to the Sacramento Area Water Forum on behalf of the joint City-County (of Sacramento) Office of Metropolitan Water Planning. The Water Forum process is a broad-based coalition of 46 stakeholders representing agriculture, business, public agencies, and environmental groups collectively developing a strategic water planning platform for the greater Sacramento area. Regularly presents technical information on reservoir operation and water management, fisheries, instream flow, and flow-habitat relationships to the Forum. Served as the technical Principal-In-Charge of the Environmental Impact Report addressing all water-related impact assessments associated with implementation of the Water Forum Agreement. Serves as a technical liaison with state and federal resource agencies to integrate the developed flow pattern for the lower American River with the Anadromous Fish Restoration Program under the Central Valley Project Improvement Act.

Hamilton City Pumping Plant Fish Screen Improvement Project EIR/EIS - Glenn-Colusa Irrigation District - Principal-In-Charge for the successful completion of an EIR/EIS for implementation of new screening facilities at the Hamilton City Pumping Plant on the Sacramento River. Managed all aquatic habitat and fisheries impacts analyses, which focused on the state and federally endangered winter-run chinook salmon. Acted as client liaison for Technical Advisory Committee meetings, field surveys, and interpretation of engineering alternatives. This project involved many state and federal agencies, including the California Department of Fish and Game, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Water Resources, and the State Reclamation Board.

Fish Screen Replacement Project EA/IS - City of Sacramento - Principal-In-Charge for preparing an EA/IS for the City of Sacramento for the improvement of fish screens at the City's Sacramento River and Fairbairn water treatment plants. Although the fish screens were in accordance with screen criteria when built, the screens are not in compliance with current California Department of Fish and Game and National Marine Fisheries Service screening criteria. SWRI is coordinating with the resource agencies for the screen design and is preparing all environmental documentation for the screen improvements. Analysis includes evaluation of impacts to resources such as fisheries and aquatic habitat, recreation, water quality, and terrestrial vegetation and wildlife.

Lower American River Aquatic Ecology Investigation - Sacramento County - Responsible for the experimental design, implementation and report preparation of multi-faceted aquatic ecology investigation of the lower American River. Investigative elements included habitat classification and mapping, application of the Instream Flow Incremental Methodology (IFIM) to determine instream flow needs, estimation of chinook salmon abundance and distribution by habitat type, microhabitat suitability data acquisition, juvenile salmon emigration data acquisition, and water temperature monitoring. The results of these investigations have been used by Mr. Bratovich in his service as a technical expert on the Alameda County Superior Court Lower American River Technical Advisory Committee associated with the retained jurisdiction in the case of the Environmental Defense Fund et al. vs. East Bay Municipal Utility District.

Fisheries Expert - Bay/Delta Oversight Council - Served as a fisheries expert on the Bay/Delta Oversight Council Aquatic Resources Technical Advisory Committee, which was initiated by the Governor of California. Provided the Committee with technical evaluations of Bay/Delta and Sacramento River system issues such as flow-habitat, Delta fish habitat requirements, and endangered species issues.

Yuba River Component of the AFRP - U.S. Fish and Wildlife Service - Provided technical and strategic oversight for the development of the Yuba River component of the U.S. Fish and Wildlife Service's AFRP Working Paper. The purpose of the review was to evaluate proposed restoration actions and develop a report identifying and prioritizing restoration and enhancement actions for the Yuba River according to technical merit and anticipated benefit.

Lower American River Component of the AFRP - U.S. Fish and Wildlife Service - Provided technical and strategic oversight for the development of the lower American River component of the U.S. Fish and Wildlife Service's AFRP Working Paper. The purpose of the review was to evaluate proposed restoration actions and develop a report identifying and prioritizing restoration and enhancement actions for the lower American River according to technical merit and anticipated benefit.

Natoma Pipeline Replacement and Folsom Water Treatment Plant Expansion Project EIR/EA - City of Folsom - Oversaw the preparation of an Environmental Impact Report for the City of Folsom Public Works Department to support its project to replace a segment of the existing Natoma Pipeline and expansion of its water treatment plant. The project involved analyzing the construction and operational impacts associated with pipeline replacement and water treatment plant expansion, as well as a 7,000 AFA increment of additional water planned to be diverted from Folsom Reservoir. The project required compliance with federal and state regulations, including the Endangered Species Act and Clean Water Act.

Central Valley Project Water Supply Contracts EIS/EIR - Sacramento County Water Agency - Provided technical and strategic oversight as the Principal-In-Charge on the joint programmatic EIS/EIR regarding implementation of Section 206 of Public Law 101-514 (the Energy and Water Development Appropriations Act of 1991). This involved the securing of water supply contracts and subsequent project-specific NEPA and CEQA documentation for the implementation of water supply alternatives for a tri-agency party. Responsibilities included assisting tri-agency efforts to maximize existing entitlements, conserve water, and develop and implement conjunctive use programs. Developed and evaluated project alternatives capable of fulfilling project purposes, with an emphasis on water supply, potentially affected hydrology, and environmental constraints. Provided strategic advice regarding local and regional sensitivities to the planning of surface water diversion, including the actual points of diversion, places of use, and related environmental issues. Provided key technical insight and expertise on behalf of the tri-agency during water supply contract negotiations with the U.S. Bureau of Reclamation.

Folsom Dam and Reservoir Interim Reoperation Agreement - Sacramento Area Flood Control Agency - Served as a technical expert as part of the contract negotiation team on behalf of the Sacramento Area Flood Control Agency for the 10-year Folsom Dam and Reservoir Reoperation Agreement with the U.S. Bureau of Reclamation. Supervised wildlife fisheries biologists and environmental planners evaluating the potential impacts to federally threatened and endangered species, and other significant biological resources due to simulated changes in reservoir storage and instream flow regimes in the Central Valley Project.

Folsom Dam and Reservoir Long-Term Reoperation Agreement - Sacramento Area Flood Control Agency - SWRI is working to determine the feasibility of indefinitely extending SAFCA's Folsom Dam and Reservoir Reoperation Agreement with the U.S. Bureau of Reclamation. SWRI is performing feasibility studies to determine the effects of reoperation given demands on the CVP, and instream requirements of the lower American River. Assisting with the development of the modeling approach to be applied to the long-term studies and providing input regarding parameters and assumptions appropriate for the impact assessments. Activities include meeting with federal and state regulatory agencies to determine the need for consultation under the federal and state Endangered Species Acts and determination of potential impacts to fishery and wildlife resources, water supply, and recreation throughout the CVP resulting from integrated reservoir operations.

Lower American River Operations Working Group - Sacramento Area Flood Control Agency – Served as a technical expert to the Lower American River Operations Working Group that meets regularly to consider and recommend stream flow releases from Folsom Dam to the lower American River based on predicted inflow, storage, and demand releases. In addition, the group evaluates coldwater pool availability in Folsom reservoir and power penstock shutter configuration for temperature-related management operations on the lower American River, in consideration of steelhead and chinook salmon lifestage requirements. Participants include the National Marine Fisheries Service, U.S. Fish and Wildlife Service, California Department of Fish and Game, and the U.S. Bureau of Reclamation.

Expert Witness and Litigation Support - On behalf of a local water district in the Sierra Nevada, coordinated and provided written and oral testimony regarding instream flow requirements for brown and rainbow trout in Mammoth Creek located in Mono County, California. Testimony included discussion of physical habitat (weighted usable area), fish population dynamics, hydrologic interpretation and facilities operation with respect to instream flow requirements.

Sonoma County Water Agency Fisheries Consultation - Sonoma County Water Agency - Served as fisheries expert on the project team to develop instream flow recommendations to protect chinook salmon and steelhead in the Eel River, California. Reviewed existing fisheries data and reports, interpreted hydrologic computer model output, and developed instream flow regimes. Reviewed project documents and reports, prepared comments, and developed responses to comments raised by various interest groups.

Gualala River Fisheries Consultation - North Gualala Water Company - Principal-in-Charge in the consultation with California Department of Fish and Game to develop instream flow recommendations for coho salmon and steelhead in the North Gualala River, California. Reviewed existing fisheries data and reports, developed habitat improvement recommendations, and evaluated existing flow requirements in consideration of alternative systems operations.

Ballona Freshwater Wetlands Operations and Maintenance Manual - Playa Vista - Serving as Principal-in-Charge in the preparation of an operations and maintenance manual for a coastal riparian and freshwater marsh restoration project in Los Angeles County. The manual requires the coordination of biological, water quality, and flood control criteria established by a multi-agency group including the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, California Coastal Commission, and California Department of Fish and Game.

Mammoth Creek Instream Flow Study - Mammoth County Water District - Supervised and participated in the management, experimental design, and execution of an IFIM study and fish resource assessment of Mammoth Creek to develop flow recommendations for brown trout. The study included seasonal hydrographic estimates, flow loss/gain analyses, habitat characterization, channel braiding evaluation, and stream temperature monitoring.

Rush Creek Instream Flow Study - California Department of Fish and Game - Participated in the experimental design and execution of an intensive IFIM investigation of Rush Creek. Served as task leader of fish population estimation data collection and analysis, and resident salmonid microhabitat suitability data acquisition. Performed habitat mapping, study area characterization, study site selection, database management, statistical analyses, and report preparation.

Lagunitas Creek Instream Flow Study - Marin Municipal Water District - Designed and conducted biological investigations to determine instream flow requirements of coho salmon and steelhead trout in Lagunitas Creek. Identified fish habitat impairing processes and habitat improvement procedures.

Yuba River Fisheries Investigation - California Department of Fish and Game - Participated in an investigation of the fishery resources of the lower Yuba River. The investigation incorporated the application of IFIM, and focused on chinook salmon and steelhead. Technical components of the investigation included aquatic habitat mapping, collection of microhabitat suitability data and development of utilization curves for key fish species, assessments of the environmental influences of irrigation diversions, fish passage facilities, and migration barriers, and characterization of the fish community.

IFIM Studies - Hydro West - Developed the experimental design and participated in fish resource assessments and IFIM studies of 11 creeks in the North Cascade Mountain Range, Washington.

IFIM Studies - Participated in IFIM studies on Silver Creek in California and Silver King Creek in Washington.

Professional Affiliations

Certified SCUBA Diver, N.A.U.I. 1975

IFG 200 – Designing and Conducting Studies Using IFIM. U.S. Fish and Wildlife Service, 1986

IFG 215 – Problem Solving With the IFIM. U.S. Fish and Wildlife Service, 1984

American Fisheries Society, Past-President, Sacramento Chapter, 1987 – 1988

Pacific Fishery Biologists